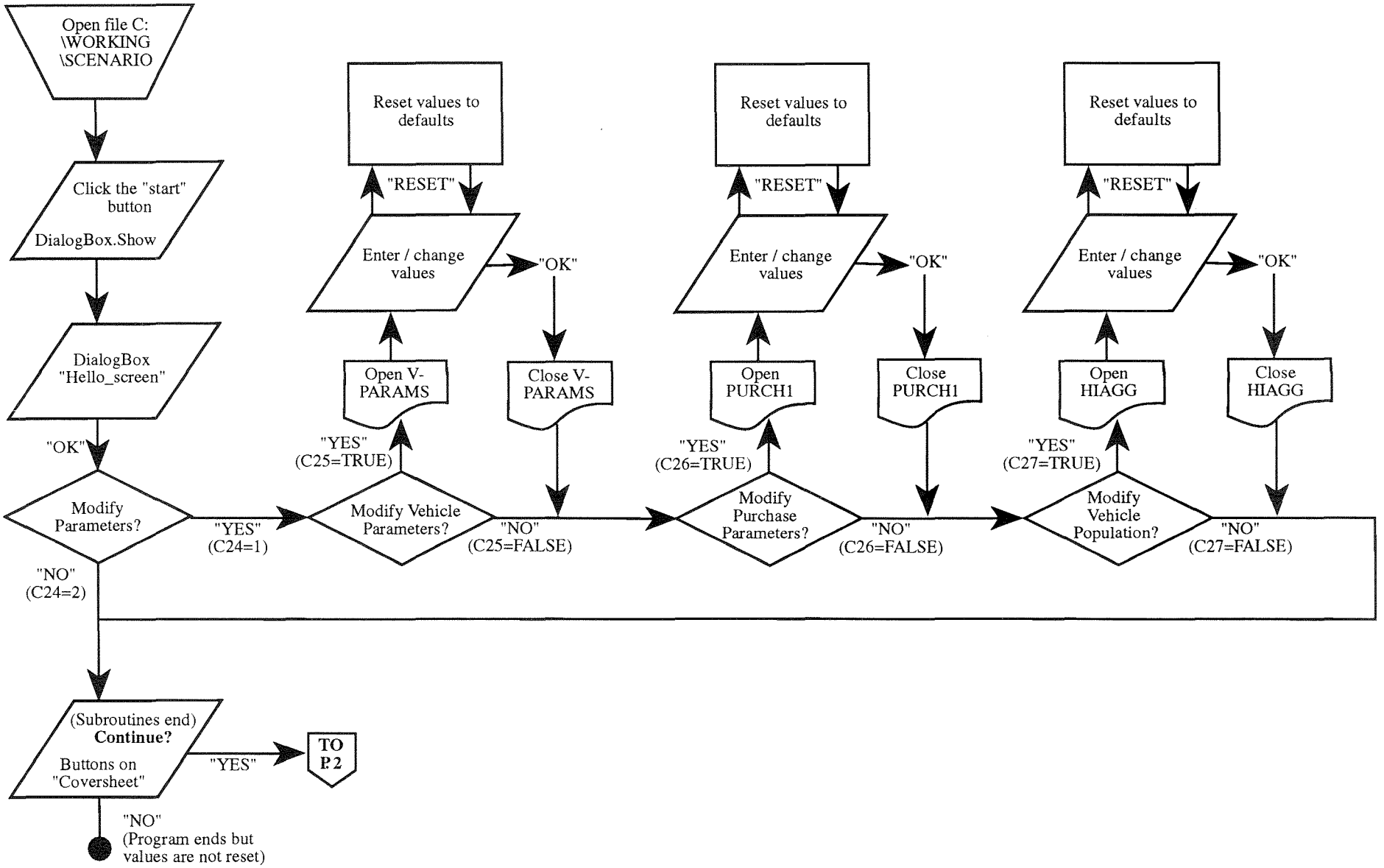
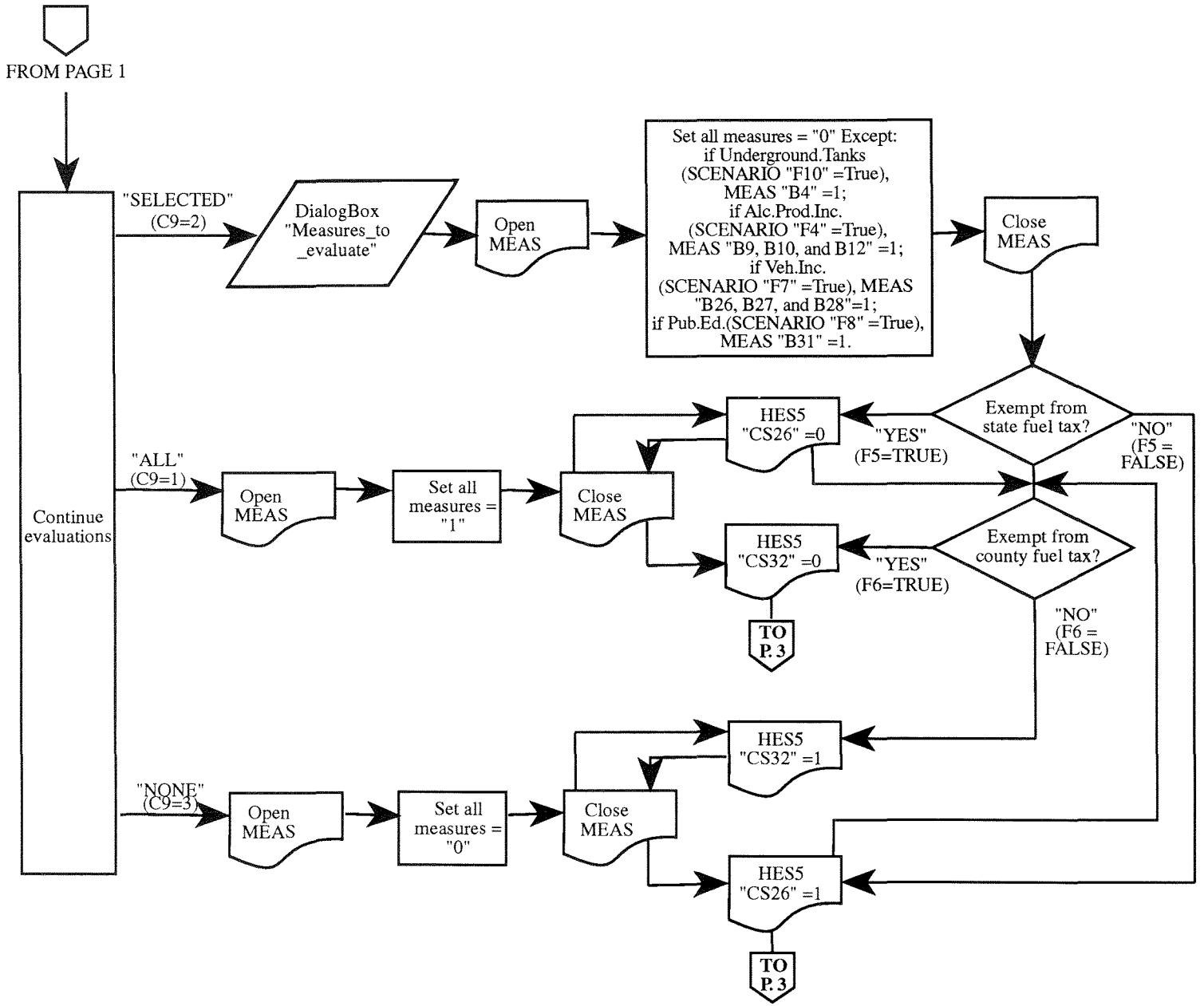
FLOW CHART OF MODEL

(APPENDIX A-4)

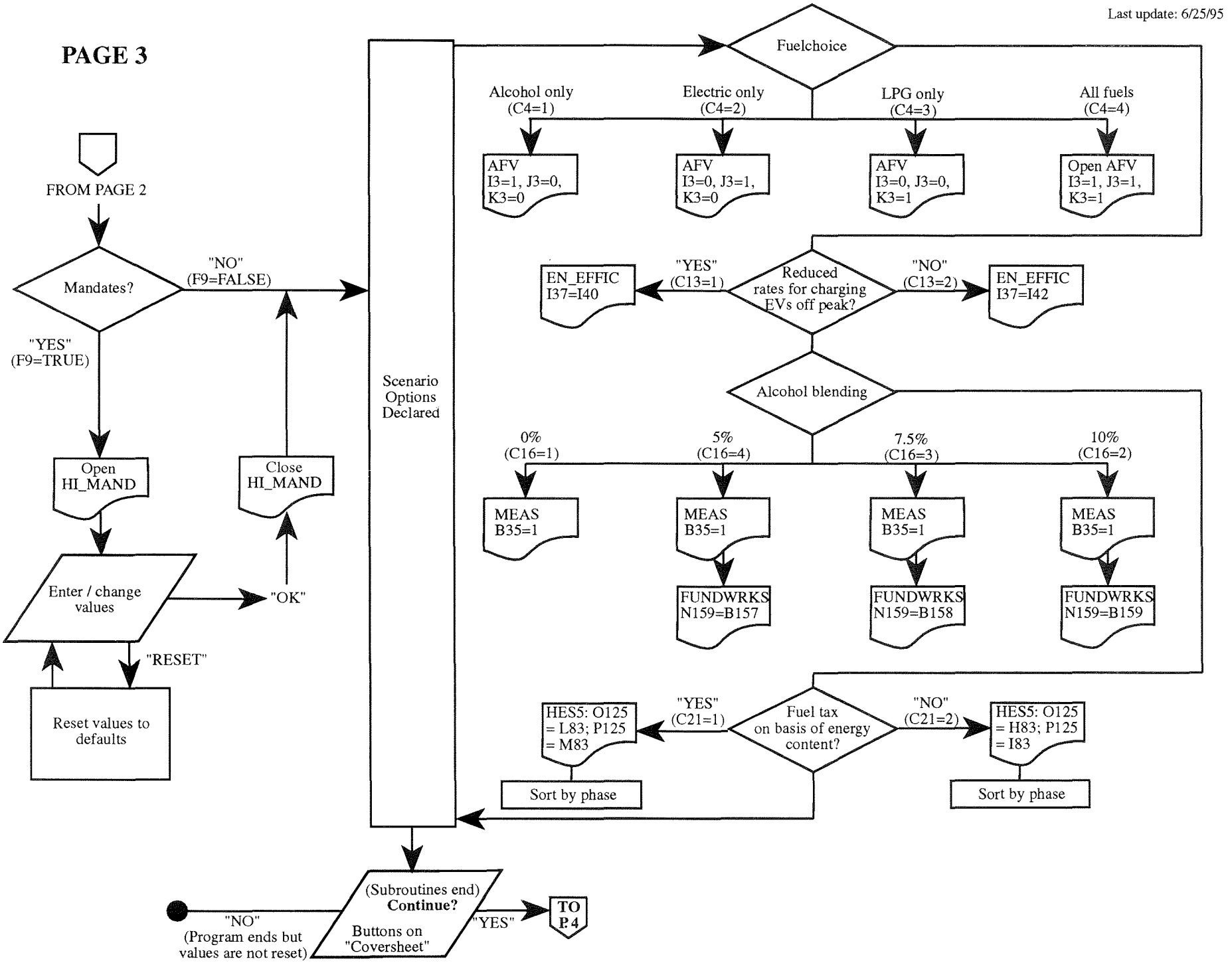
Last update: 6/25/95



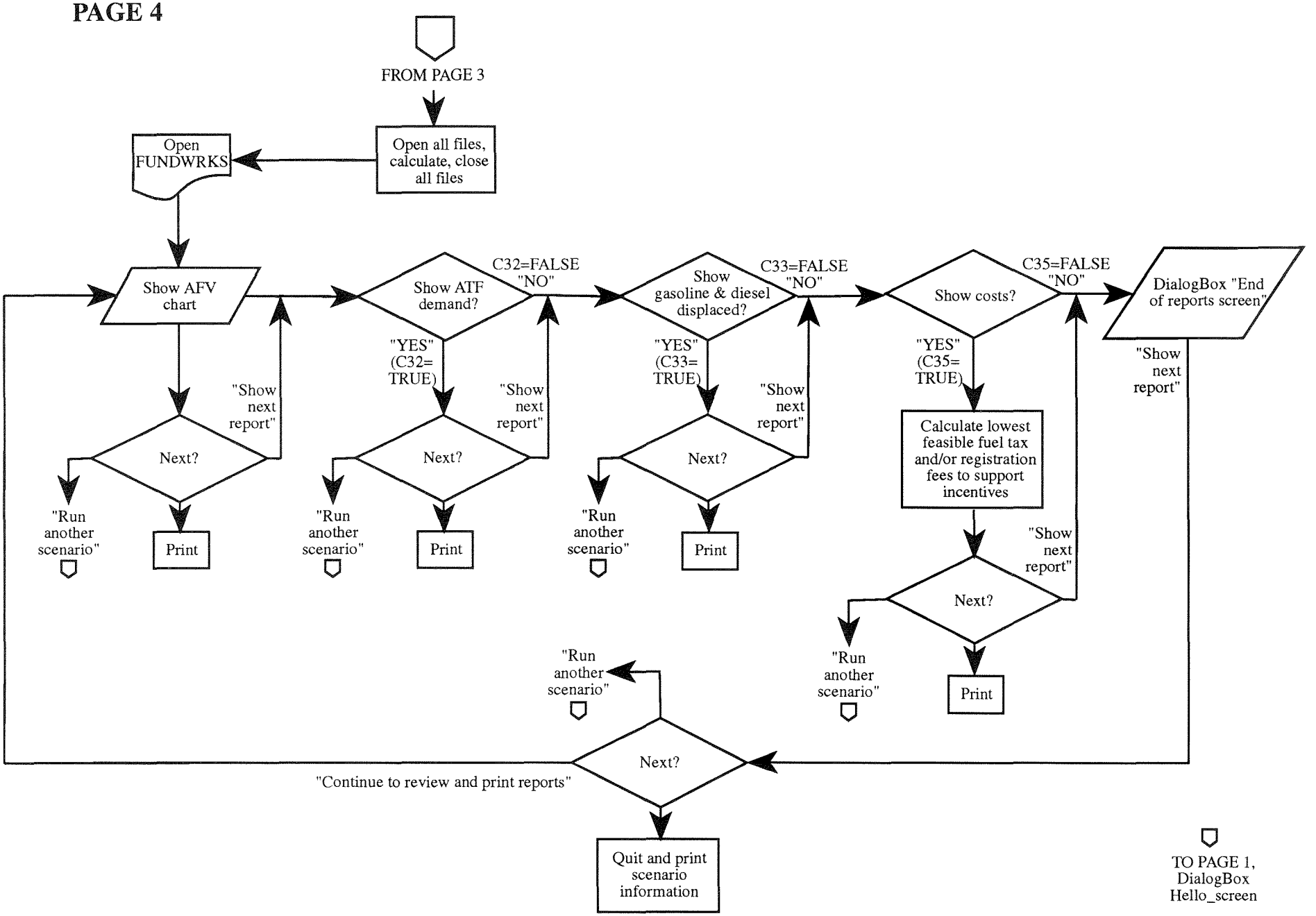

FROM PAGE 1
Continue evaluations
"SELECTED" (C9=2)
DialogBox "Measures_to _evaluate"
Open MEAS
Set all measures = "0" Except: if Underground.Tanks (SCENARIO "F10" =True), MEAS "B4" =1; if Alc.Prod.Inc. (SCENARIO "F4" =True), MEAS "B9, B10, and B12" =1; if Veh.Inc. (SCENARIO "F7" =True), MEAS "B26, B27, and B28"=1; if Pub.Ed.(SCENARIO "F8" =True), MEAS "B31" =1.
Close MEAS
Exempt from state fuel tax?
"YES" (F5=TRUE)
"NO" (F5 = FALSE)
HES5 "CS26" =0
"ALL" (C9=1)
Open MEAS
Set all measures = "1"
Close MEAS
Exempt from county fuel tax?
"YES" (F6=TRUE)
"NO" (F6 = FALSE)
HES5 "CS32" =0
TO P. 3
"NONE" (C9=3)
Open MEAS
Set all measures = "0"
Close MEAS
HES5 "CS32" =1
HES5 "CS26" =1
TO P. 3

Last update: 6/25/95

PAGE 3



PAGE 4


FROM PAGE 3
Open all files, calculate, close all files
Open FUNDWRKS
Show AFV chart
Show ATF demand?
C32=FALSE "NO"
Show gasoline & diesel displaced?
C33=FALSE "NO"
Show costs?
C35=FALSE "NO"
DialogBox "End of reports screen"
"YES" (C32= TRUE)
"YES" (C33= TRUE)
"YES" (C35= TRUE)
"Show next report"
Next?
"Run another scenario"
Print
Calculate lowest feasible fuel tax and/or registration fees to support incentives
"Continue to review and print reports"
Quit and print scenario information
TO PAGE 1, DialogBox Hello_screen

INSTRUCTIONS FOR THE ALTERNATIVE TRANSPORTATION FUELS SCENARIO BUILDER

PURPOSE

The Alternative Transportation Fuels Scenario Builder was developed for in-house use in **estimating** the impact, effectiveness, costs, etc. of various policies or measures which have been suggested as possible means of influencing the use of alternative transportation fuels.

As with any first-generation model, refinements and improvements may be added as time and resources permit.

COMPUTER HARDWARE / SOFTWARE REQUIREMENTS

The model runs in Microsoft Excel, version 5.0, and is comprised of discrete sections which are integrated via an Excel workbook named "SCENARIO.XLS." The twenty-two files fit on five high-density floppy diskettes. The minimum memory (RAM) sufficient to run the model has not been determined, but the model has been run successfully on a PC running under Windows with 8 MB of RAM.

INSTALLATION

All files should be located in the same directory, named "WORKING," which should not be in any other subdirectories (i.e. C:/WORKING/*.*).

USE

Open the application "Microsoft Excel" (version 5.0 or later).

From the File menu, select "open." Go up to the folder **c:** and click "OK." Scroll all the way to the bottom of the list of folders, select the folder named "**WORKING**," and click "OK." Scroll down the list of files, select the file named "**SCENARIO.XLS**," and click "OK."

When asked, "This document contains links. Re-establish links?" Select "NO."

A "welcome" screen will appear. Click on the START button when ready.

Note: Use the above procedure every time. DO NOT try to open SCENARIO.XLS from the list of "recent documents." (Although the file will open, the directory path may not be set properly.)

- **Beginning the scenario run**

The first screen asks for several selections:

Fuels

Choices:	alcohol only, electric only, LPG only, or all fuels simultaneously.
Comment:	select "all fuels simultaneously." The other options are for testing purposes only.
Recommended:	"all fuels simultaneously."

Measures to evaluate

Choices: all proposed incentives and mandates, selected incentives and mandates, no incentives or mandates.

Comment: if "selected incentives and mandates" is chosen, you will (in a later screen) have an opportunity to indicate which incentives or mandates to include in the scenario.

Recommended: "selected incentives and mandates."

Reduced rates for charging electric vehicles (EVs) off-peak

Choices: yes or no.

Comment: if "yes" is selected, the electricity price used for EV recharging is the HECO rate schedule "U," time-of-use service; if "no" is selected, the electricity price used for EV recharging is the HECO rate schedule "R," residential service.

Recommended: "yes."

Alcohol blending in gasoline

Choices: 0%, 5%, 7.5%, 10%.

Comment: the percentage selected is applied to the projected gasoline demand remaining after the alternative fueled vehicles have been taken into account.

Alcohol blending in diesel

Choices: 0%, 5%, 10%, 30%.

Comment: the percentage selected is applied to the projected diesel demand remaining after the alternative fueled vehicles have been taken into account.

Fuel tax on the basis of energy content?

Choices: yes or no.

Comment: if "yes" is selected, state and county fuel taxes are adjusted to account for the fact that alternative fuels contain less energy per gallon; if "no" is selected, current tax rates are used.

Recommended: "yes."

Modify / view parameters?

Choices: yes or no; if yes, possibilities are vehicle technology / cost; vehicle population; purchaser bias; and phases / credits.

Comment: for each parameter to be viewed and/or modified, the user will (at a later screen) have an opportunity to view current settings and to modify them, reset them to defaults, or to make no changes.

Recommended: "yes" to all.

Reports

Choices: number of vehicles; quantity of fuel used; gasoline and diesel displaced; costs and employment.

Comment: choice of reports does not have any effect on the results of the scenario run itself.

Recommended: all reports.

Scenario Name

Choices: User-entered.

Comment: entering a descriptive name for the scenario will help to identify the results. Any combination of letters, numbers, and symbols is acceptable.

The name will automatically be entered into the scenario results storage file (DATAKEEP.XLS) and will become a legend identifying the run when the comparison graph is developed.

If the name is too long it may not fit on the graph. The shorter the better; suggest fewer than 30 characters.

- **Modifying vehicle technology and cost**

  If the "modify / view vehicle technology" option was selected, this screen will appear. (And if you didn't select the "modify / view vehicle technology" option, you can skip this part.)

  This screen allows you to modify the vehicle characteristics of alcohol, electric, and/or propane vehicles. (Gasoline vehicle numbers are for comparison purposes only and do not need to be / cannot be changed here.)

  All costs are in constant dollars.

  These values will remain until they are selected again and changed by the user.

  Recommended: "Reset to Defaults."

- **Modifying purchaser bias**

  If the "modify / view purchaser bias" option was selected, this screen will appear.

  This screen allows you to adjust for differences in perception between Hawaii and California, since the vehicle purchase portion of the model is based on stated purchase preferences from California.

  These values will remain until they are selected again and changed by the user.

  Recommended: "Reset to Defaults."

- **Modifying vehicle population parameters**

  If the "modify / view vehicle population" option was selected, this screen will appear.

  This screen allows you to adjust the average annual rate of vehicle population increase. The default rate (2.02%) is based on the increase in vehicle miles traveled that was projected in the state and county transportation plans, prepared in the late 1980s, which provided the baseline for the Transportation Energy Strategy project.

  You will also be able to change the "percent of vehicles resold in-state as used vehicles."

  These values will remain until they are selected again and changed by the user.

  Recommended: "Reset to Defaults."

- **Modifying phases / credits**

  If the "modify phases / credits" option was selected, this screen will appear.

  This screen allows you to adjust the phases, incentive amounts, and phase-out schedules for the credits. The default rate, when used with other default elements, roughly corresponds to vehicle population numbers of demonstration (phase 1), fleet use (phase 2), transition (phase 3), maturing (phase 4) and mature (phase 5).

These values will remain until they are selected again and changed by the user.

Recommended: "Reset to Defaults."

- **CONTINUATION CHECK #1**

  This is just an escape point (and/or shortcut re-entry point) for advanced users. If you are ready to continue, click the "continue" button.

- **Measures to evaluate**

  If the "selected incentives and mandates" option was selected, this screen will appear. Any combination of incentives and mandates may be selected (remember the name you gave this scenario run in the first screen - choose incentives to match the scenario name).

  Fuel incentives

  Choices: local producers of alcohol fuels receive production incentive; alternative fuels exempt from state highway taxes; alternative fuels exempt from county highway taxes.

  Comment: choosing a fuel incentive automatically includes an increased tax on gasoline and diesel to provide the necessary funding for the fuel incentive measure(s).

  Vehicle incentives / mandates

  Choices: Purchasers of alternative fuel vehicles receive purchase incentive; state government fleets purchase AFVs; State law mandates private fleet purchase of alternative fuel vehicles.

  Comment: choosing a vehicle purchase incentive automatically includes a surcharge on gasoline and diesel-fueled vehicles to provide the necessary funding for the fuel incentive.

  General

  Choices: public and private organizations cooperate to increase public awareness of alternative fuels; new or replacement fuel tanks (specifically, underground retail service station storage tanks) are double-walled stainless steel.

  Comment: both of these measures are generally under way, although the rate or extent to which these measures are occurring may vary with location and circumstances.

  Recommended: public and private organizations cooperate to increase public awareness of alternative fuels; new or replacement fuel tanks are double-walled stainless steel (run with both boxes checked).

Fleet mandates

If you selected an option which includes private fleet mandates, this screen will appear.

This screen allows you to adjust percentage requirements for rental and private (non-rental) fleets. For your information, percentage requirements in the National Energy Policy Act of 1992 (EPACT) are also shown on this screen.

Recommended: "Reset to Defaults."

CONTINUATION CHECK #2

This is another escape point. If you are ready to continue, click the "continue" button.

Your scenario run is complete!

Your scenario has been calculated successfully. To view results, select "view."

Projected number of alternative fuel vehicles (AFVs)

This is the first view of the results. Select "print" or "show next report."

Selecting print will print three graphs - projected number of alternative fuel vehicles, projected fuel demand for all ground transportation fuels on a gasoline-equivalent gallon (GEG) basis, and projected demand for alternative fuels only.

Projected use of alternative transportation fuels

This is a tabular report of the actual gallons and/or kWh of alternative fuels projected. For an explanation of the difference between "actual gallons" and gasoline-equivalent gallons (GEG), see the Transportation Energy Strategy Project final report.

Gasoline and diesel displaced by alternative fuels

This is a tabular report of the projected demand by the ground transportation sector in the State of Hawaii for gasoline-equivalent gallons (GEG) of conventional and alternative fuels.

Cost

If the numbers in the second column (Additional costs ..to motorists (additional fuel taxes and / or vehicle registration fees) are greater than $0, additional calculations are necessary to make sure that funds into the program and funds out of the program are balanced. If those calculations are necessary, the column will be highlighted in yellow and instructions will be shown on the screen.

If instructed to do so, click the "Optimize Costs" button. If asked any questions, just hit "ENTER" on your keyboard.

- You may get a message saying, "SOLVER.XLA is already open. Reopening will cause your changes to be discarded. Do you want to reopen?" Don't panic, this is perfectly OK. Select "Yes."
- After some calculations, you may get a message that the maximum time has expired. Select "Continue."
- You will get a "Solver Results" screen. Whether or not Solver thinks it has found a solution, Select "OK." (Yes, "Keep solver results.")
- After more calculations, you may get a message that the maximum time has expired. Select "Continue."
- You'll get a second "Solver Results" screen. Whether or not Solver thinks it has found a solution, Select "OK." (Yes, "Keep solver results.")
- Finally, you'll be returned to the "Cost" screen, where (now that everything has been balanced out) you can go ahead and "print" or show next report.

If you select "Print," it will print out the cost screen and several additional pages of detail.

End of scenario run

Selecting "Continue to review and print reports" will send you back to the reports you have just seen, in case you want to take another look, print out, or forgot to optimize the costs.

Selecting "Return to Welcome screen" will first send a set of results to an excel file named "DATAKEEP.XLS." You will then be taken back to the first screen, where you will be able to print out your scenario parameters before starting the next run.

When a set of scenario runs is completed

When all scenario runs are completed, you may see the results compared to each other. At the "Welcome" screen, select the button, "finished - compare results."

When asked what you want to name your comparison, use standard file naming conventions (up to 8 letters, etc.) IF YOU GET ANY KIND OF WARNING MESSAGES, DO NOT CONTINUE (i.e. select "NO" or "QUIT" or "ESCAPE") - you don't want to accidentally overwrite something.

Data from your runs will be saved to a file with the name you chose, and graphs containing comparisons will be generated. You will be able to view, change, and print them using standard Excel commands. When finished, select the "DONE" button above the graphs and you will be back at the now-familiar "Welcome" screen. (Where you may start a whole new set of scenario runs, if you want to.)

Since the runs will be together on the graphs, and too many runs together make differentiating between them difficult, it is suggested that runs be done in batches of not more than ten (i.e. not more than ten runs per graph; five is preferable).

Finished for the day

Select "close" from the File menu.

When asked if you want to save changes to SCENARIO.XLS, select "NO."

Select "exit" from the File Menu.

INFORMATION FLOW BETWEEN SPREADSHEETS

FUEL COSTS

Fuel production costs (ethanol and methanol only)

Methanol fuel production costs are calculated in METH.XLS, using inputs of feedstock cost and facility size from HES5.XLS.

Ethanol fuel production costs are calculated in BIOY.XLS (ethanol from sugarcane, 2 scales of facility) and MOL.XLS (ethanol from solid waste, 2 scales of facility, and ethanol from molasses, 2 scales of facility). Facility scales for molasses and solid waste are constrained by the amount of material available on any one island; information on organic waste is provided by ORGW.XLS. MOL.XLS obtains parameters such as interest and depreciation rates from HES5.XLS and forwards them to BIOY.XLS.

Transportation and infrastructure costs

Transportation and infrastructure costs are combined with the various alcohol production evaluations to give a total of 30 alcohol fuel scenarios, each with a "low" and a "high" price-at-the-pump cost estimate.

Taxes

Federal, state, and local taxes for gasoline, diesel, and the various alternative fuels are contained in HES5.XLS. The "proposed" state and county fuel tax rates (adjusted on the basis of energy content) are calculated separately; pump prices using taxes adjusted on the basis of energy content may replace price-at-the-pump cost estimates using conventional taxes by running SCENARIO.XLS.

NUMBER OF ALTERNATIVE FUEL VEHICLES

Voluntary purchases of alternative fuel vehicles.

Voluntary purchases are estimated based on vehicle characteristics (vehicle cost, fuel cost, top speed, range, acceleration, cargo space, service station availability, service station refueling time, home recharge availability and recharging time) compared against a baseline gasoline vehicle. Since vehicle characteristics are projected to change over time, the user may enter the assumed vehicle characteristics for certain years into VEHICLES.XLS. The relative attractiveness of each vehicle type, based on vehicle characteristics from VEHICLES.XLS, is calculated in PURCHASE.XLS. For each year, vehicle price for non-government purchasers is adjusted to reflect any vehicle purchase incentives proposed in FUNDWRKS.XLS. Also, since sensitivity to price is income-dependent, purchases are estimated for each income level. The resulting purchase estimates are combined by AFV.XLS, assuming AFV availability rates and a diffusion time which is dependent upon public awareness levels (time for diffusion is obtained from FUNDWRKS.XLS, with and without public awareness efforts as stated in MEAS.XLS). Resultant voluntary purchases are provided to HI_VOL.XLS.

Federally-mandated purchases of alternative fuel vehicles.

Although a federal mandate (e.g. the National Energy Policy Act of 1992) may require that a certain percentage of new vehicles in affected fleets shall be alternatively fueled, the choice of what mix of alternative fuel vehicles to purchase is expected to be similar to the mix calculated for voluntary purchases in each phase. First, the numbers of vehicles required for each type of fleet are determined in HI_FED.XLS; then, the relative mix of alternative fuels is obtained from AFV.XLS and applied to the number of vehicles required, to give a total number of each type of vehicle in HI_FED.XLS.

State-mandated purchases of alternative fuel vehicles.

In SCENARIO.XLS, the user is able to specify whether or not state mandates are included in scenario runs. Percentages for private and rental fleets are user-entered in HI_MAND.XLS. In an approach similar to the federal mandates, the total number of AFVs required is distributed across fuel types based on the relative attractiveness of each fuel.

State government vehicles are assumed to follow the 25% requirement in Administrative Directive 94-06 beginning in 1998 if "state fleet purchase of AFVs" is selected.

Total number of alternative fuel vehicles.

In HIAGG.XLS, the maximum of each of the three possible situations (voluntary, federal mandate, or state mandate) is used to obtain the number of alternative fuel vehicles purchased by the given fleet in the given year. Then, the relative attractiveness of the fuels (from AFV.XLS) is applied to that number, and the total is used in all subsequent calculations, including the sale of vehicles to used vehicle purchasers.

The total number of new vehicles purchased per year may be adjusted in HIAGG.XLS by the user via SCENARIO.XLS. The default value is based on the number of vehicles assumed to be on the road in FUTR-FUE.XLS, which is based on DOT projections used for this study. When vehicle growth rate is changed, the fuel use per vehicle (which includes a congestion factor) also changes. Fewer vehicles on the road would result in less loss of fuel to congestion and therefore lower overall fuel wasted in congestion per vehicle.

TOTAL DEMAND FOR ALTERNATIVE FUELS

Demand from alternative fuel vehicles.

The numbers of alternative fuel vehicles is provided by HIAGG.XLS to FUNDWRKS.XLS, where the number of conventionally-fueled vehicles and demand for the various types of fuels is determined.

Demand from alcohol blending.

Scenarios may be run which include no alcohol blending, 5% blending into gasoline, 7.5% blending into gasoline, and 10% blending into gasoline; and/or 5% blending into diesel, 10% blending into diesel, and 30% blending into diesel. The user-specified amount of blending is entered via SCENARIO.XLS into FUNDWRKS.XLS, and is applied to the amount of gasoline and diesel used by conventionally-fueled vehicles. If the rate of alcohol blending in gasoline is greater than the amount which could be supplied by methanol, the alcohol assumed for blending is ethanol (this information is

supplied to HES-5 via SCENARIO.XLS for use in phasing and costing of the scenarios).

REDUCED RATES FOR CHARGING ELECTRIC VEHICLES "OFF-PEAK"

Electric vehicle charging is addresses in EN-EFFIC.XLS via SCENARIO.XLS and the resultant "fuel cost" is used in PURCHASE.XLS.

ADJUST FUEL TAXES ON THE BASIS OF ENERGY CONTENT

This measure is addressed in HES5.XLS via SCENARIO.XLS. (Since adjusting the fuel taxes results in the same net amount into the highway fund per alternative fuel vehicle as for a comparable conventionally-fueled vehicle, this measure is not considered an incentive.)

EVALUATION OF INCENTIVES AND MANDATES

Scenarios may be run with or without various incentives and mandates (listed in MEAS.XLS) via SCENARIO.XLS. Incentives and mandates may also be adjusted (for example, the amounts and phase-outs of purchase incentives may be adjusted directly in FUNDWRKS.XLS).

Special fund for alternative fuel incentives

This measure involves assessing an extra tax on gasoline and diesel fuels and using the revenues to fund alternative fuel subsidies (primarily producer payments for local production of alcohol fuels, although distribution may be changed by restructuring FUNDWRKS.XLS). The amount of subsidy is the difference between the cost per gasoline equivalent gallon (GEG) of the alcohol fuel and the cost per gallon of gasoline. This difference is dependent upon the scale of production and other factors included in the alcohol production scenarios, including taxes, transportation, infrastructure, and feedstock costs. Alcohol scenarios are grouped into "phases" and the average of the minimum low- and minimum high-end cost estimates in each phase is used to estimate the amount of subsidy for that phase. (This occurs in HES5.XLS.) The subsidies remain the same or decrease from one phase to the next. If the measure is active, the subsidy is used to reduce the fuel cost in the PURCHASE.XLS file.

The amount of additional tax is optimized by running the macro *solver_run* in FUNDWRKS.XLS when prompted to do so. If this is not done, program expenditures may exceed program receipts.

Special fund for vehicle incentives

This measure involves assessing an extra fee on gasoline and diesel vehicles and using the revenues to fund incentives for the purchase of alternative fuel vehicles. The incentives are set amounts for light-and heavy-duty alcohol and electric vehicles and are reduced by a certain percentage in each phase. Incentive amounts and phase-outs may be changed in FUNDWRKS.XLS. If the measure is active, the incentive amounts are used to reduce vehicle costs in the PURCHASE.XLS file.

The amount assessed on conventional vehicles is optimized by running the macro *solver_run* in FUNDWRKS.XLS when prompted to do so. If this is not done, program expenditures may exceed program receipts.

Exempt alternative fuels from state and county highway taxes

Although not listed in MEAS.XLS, the effect of this measure may be assessed via SCENARIO.XLS.

MODIFYING ASSUMPTIONS

The assumptions most likely to be revised (i.e. AFV technologies and costs; fleet growth rates) may be modified through SCENARIO.XLS. However, other assumptions may also require modification. To change feedstock costs or other alcohol fuel costs, change the values in HES5.XLS, column T (alcohol scenario input section). To change federal (or other) fuel tax rates, go to HES5.XLS, range CO9:CS22. To change rack price of gasoline, go to HES5.XLS, cell CR63. To change AFV availability rates, go to AFV.XLS and change the values in columns B (cars) and C (trucks) in the 3 "detail" worksheets. To run the model without EPACT requirements, change the "1" in HIAGG.XLS cell A100 to "0", open STFL.XLS, save and close both, then run SCENARIO.XLS. To change fuel efficiency assumptions for future years, go to FUTR-FUE.XLS, "Argonne" worksheet. Once changes have been made, all spreadsheets should be opened simultaneously and allowed to update.

LINKED TO (SOURCE):

DESTINATION — Filename	AFV.XLS	BIOY.XLS	COUNTIES.XLS	EN-EFFIC.XLS	FUNDWRKS.XLS	FUTR-FUE.XLS	HES5.XLS	HI_FED.XLS	HI_MAND.XLS	HI_VOL.XLS	HIAGG.XLS	MEAS.XLS	METH.XLS	MOL.XLS	ORGW.XLS	PURCHASE.XLS	REGV.XLS	SCENARIO.XLS	STFL.XLS	VEHICLES.XLS	VEH-TYPE.XLS	NONE	Filename
AFV.XLS					X						X					X							AFV.XLS
BIOY.XLS							X																BIOY.XLS
COUNTIES.XLS																						N	COUNTIES.XLS
EN-EFFIC.XLS																						N	EN-EFFIC.XLS
FUNDWRKS.XLS	X						X				X	X					X	X			X		FUNDWRKS.XLS
FUTR-FUE.XLS											X						X						FUTR-FUE.XLS
HES5.XLS		X										X	X	X			X						HES5.XLS
HI_FED.XLS	X										X					X			X				HI_FED.XLS
HI_MAND.XLS	X										X	X				X		X					HI_MAND.XLS
HI_VOL.XLS	X										X					X							HI_VOL.XLS
HIAGG.XLS	X					X		X	X	X						X	X	X	X		X		HIAGG.XLS
MEAS.XLS																						N	MEAS.XLS
METH.XLS							X																METH.XLS
MOL.XLS		X					X								X								MOL.XLS
ORGW.XLS																						N	ORGW.XLS
PURCHASE.XLS	X			X	X		X				X							X		X	X		PURCHASE.XLS
REGV.XLS							X														X		REGV.XLS
SCENARIO.XLS				X	X				X		X					X				X			SCENARIO.XLS
STFL.XLS											X												STFL.XLS
VEHICLES.XLS					X													X					VEHICLES.XLS
VEH-TYPE.XLS			X								X						X						VEH-TYPE.XLS
	AFV.XLS	BIOY.XLS	COUNTIES.XLS	EN-EFFIC.XLS	FUNDWRKS.XLS	FUTR-FUE.XLS	HES5.XLS	HI_FED.XLS	HI_MAND.XLS	HI_VOL.XLS	HIAGG.XLS	MEAS.XLS	METH.XLS	MOL.XLS	ORGW.XLS	PURCHASE.XLS	REGV.XLS	SCENARIO.XLS	STFL.XLS	VEHICLES.XLS	VEH-TYPE.XLS	NONE	

Note: Save source workbooks before saving dependent workbooks.

LINKED TO (SOURCE):